

**Appln No. 09/989,367**  
**Amdt date March 13, 2006**  
**Reply to Office action of December 13, 2005**

### **REMARKS/ARGUMENTS**

In the Office action dated December 13, 2005, the Examiner rejected claims 1 - 46 and 49 - 50 under 35 U.S.C. § 102 or 35 U.S.C. § 103. By this Amendment, Applicant has amended claims 37 - 42. Reconsideration and reexamination are hereby requested for claims 1 - 46 and 49 - 51 that are pending in this application.

#### **Response to the 35 U.S.C. § 102 Rejections of the Claims**

The Examiner rejected claims 37, 38, 40 and 41 under 35 U.S.C. § 102(b) as being anticipated by the article by Agarossi, et al. (hereafter referred to "Agarossi"). Claims 37 and 40 are independent.

Applicant respectfully submits that Agarossi does not teach or suggest amended claim 37 or amended claim 40. Claim 37 recites, in part: "estimating, in a nonlinear channel estimator having a memory width, expected values of the received signal" and "computing branch metrics over a number of states based on the expected values of the received signal, wherein the number of states corresponds to the memory width." Claim 40 recites, in part: "a nonlinear channel estimator, having a memory width, that computes expected values of the received signal" and "a branch metrics computer for computing branch metrics over a number of states based on the expected values of the received signal, wherein the number of states corresponds to the memory width." There is no teaching or suggestion in Agarossi to provide a non-linear channel estimator and a Viterbi decoder where the number of states corresponds to the memory width. Accordingly, Applicant submits that independent claims 37 and 40 and claims 38 - 39 and 41 - 42 that depend on claims 37 and 40, respectively, are not anticipated by or obvious in view of Agarossi.

#### **Response to the 35 U.S.C. § 103 Rejections of Claim 1 - 22**

The Examiner rejected claims 1 - 22 under 35 U.S.C. § 103(a) as being unpatentable over the article by Sands, et al. (hereafter referred to as "Sands"), in view of Sakaguchi et al., U.S.

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Patent No. 4,747,094 (hereafter referred to as "Sakaguchi"). Claims 1 and 11 are independent. In rejecting independent claims 1 and 11 the Examiner stated the Sands and Sakaguchi are analogous art because they are from the same field of endeavor and it would have thus been obvious to combine Sands and Sakaguchi.

Applicant respectfully submits that Sands and Sakaguchi are not from the same field of endeavor. Sands relates to "identifying the digital magnetic recording channel in which data dependent nonlinear effect are present." See Sands, Abstract. In contrast, Sakaguchi relates to a signal coupling system for optical repeater system. Here, a "[s]ignal coupler couples multiple transmitter-receivers through optical fiber cables and at least one repeater on a bit-multiplex system." See Sakaguchi, Abstract. Sands in no way relates to fiber optic systems or coupling optical systems and Sakaguchi in no way relates to digital magnetic recordings or identifying non-linear channels. Accordingly, one skilled in the art would not have been motivated to combine Sands and Sakaguchi to provide either claim 1 or claim 11.

As discussed in Applicant previous response, optical fiber channels have distinct characteristics due to the properties of one or more of the laser, the fiber and the photodetector. As a result of these characteristics an optical fiber data channel may exhibit undesirable characteristics such as dispersion and scattering. See, for example, Applicant's Specification at page 2 - 3. There is no teaching or suggestion in the art that the techniques used in Sands could or should be used to address the unique problems associated with an optical fiber data channel. In view of the above, Applicant submits that independent claims 1 and 14 and claims 2 - 10, 12 - 22 and 51 that depend on either claim 1 or 11 are not obvious in view of Sands and Sakaguchi.

In addition, the dependent claims are patentable over these references for the additional references that they contain. For example, claim 12 recites, in part: "accepting a product of the most recent value of the sequence of data input to the data channel and a second most recent value of the sequence of data input to the data channel into a second FIR; and summing an output of the first FIR and output of the second FIR to form the channel model value." Sands does not teach or suggest the claimed method for forming a channel model value. Section 3 of Sands cited by the Examiner (in particular Table 1) describes a comparison of two different FIR models

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with an FSM model. Here, the two FIR models are not used together. Rather the characteristics of the different models are being compared. Moreover, Sands does not teach or suggest the specific use of multiple FIRs as set forth in claim 12.

Claim 13 recites, in part: "accepting a product of the most recent value of the sequence of data input to the data channel and a third most recent value of the sequence of data input to the data channel into a third FIR; and summing an output of the first FIR and output of the second FIR and output of the third FIR to form the channel model value." Sands also does not teach or suggest this claimed method for forming a channel model value.

Claim 14 recites in, part: "accepting a product, said product being the most recent value of the sequence of data input to the data channel and the two next most recent data input, into a fourth FIR; and summing an output of the first FIR and output of the second FIR and output of the third FIR and output of the fourth FIR to form the channel model value." Sands does not teach or suggest this claimed method for forming a channel model value.

Claims 15 - 22 relate to updating multiple FIR filters. Section 2.6 of Sands cited by the Examiner relates to updating model parameters for a linear model (FIR). This section does not mention multiple FIR filters for a Volterra Series representation as claimed, nor does it mention updating multiple FIR filters for a Volterra Series representation as claimed.

New claim 51 recites, in part: "configuring the channel model in accordance with a training sequence." There is no teaching or suggestion in the cited art to use a training sequence as claimed.

#### Response to the 35 U.S.C. § 103 Rejections of Claim 43, 44, 46 and 49

The Examiner rejected claims 43, 44, 46 and 49 under 35 U.S.C. § 103(a) as being unpatentable over Sakaguchi in view of Agarossi. Claims 43 and 46 are independent.

Applicant maintains its position that Sakaguchi does not provide an explicit teaching regarding the asserted subject matter as is required of a proper reference under 35 U.S.C. § 103. As discussed in prior responses, Sakaguchi does not teach or suggest "converting the electrical signal to a multibit digital representation" as set forth in claim 43 or "an analog to digital

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converter that converts the electrical signal to a multibit digital representation” as set forth in claim 46.

In the latest Office action the Examiner asserts that the above limitations are taught at column 9, lines 24 - 25 which recites: “An optical fiber digital signal branch-transmission system.” While this preamble suggest that the optical signal may be digital, it says nothing regarding an electrical signal.

In contrast, in the detailed description of the invention, Sakaguchi makes no mention of converting an electrical signal as claimed. Moreover, as discussed at length in Applicant’s response filed on August 9, 2005, the actual circuitry of Sakaguchi in fact reads manipulation of analog signals. In view of the above, Applicant maintains that Sakaguchi is simply not a proper reference for the asserted teachings.

Response to the 35 U.S.C. § 103 Rejections of Claims 23 - 36, 45 and 50

The Examiner rejected claims 23 - 36, 45 and 50 under 35 U.S.C. § 103(a) as being unpatentable over Sakaguchi in view of Agarossi and further in view of Sands. Claims 23 and 30 are independent. Claims 24 - 29 depend on claim 23. Claims 31 - 36 depend on claim 30. Claim 45 depends on claim 43. Claim 50 depends on claim 46.

These rejections are based on a combination of no less than three references from three separate fields of endeavor. Sakaguchi involves a coupling system for an underwater optical repeater system. Agarossi involves a receiver for an optical disc. Sands involves digital magnetic recordings. Applicant respectfully submits that due to the diverse nature of these references, there could not have been any motivation for one skilled in the art to combine all three of these references for any reason.

Moreover, there is no teaching to combine these three references in such a manner that would provide exactly the claimed methods and apparatuses. The Examiner asserts that a motivation would spring from a desire to reduce ISI and mean-squared error. However, the Examiner points to no teaching in the art regarding why one skilled in the art would select the specific elements from each of these three references that were selected by the Examiner.

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Moreover, the Examiner points to no teaching in the art regarding why one skilled in the art would combine these reference in a specific manner that allegedly reads on the claims.

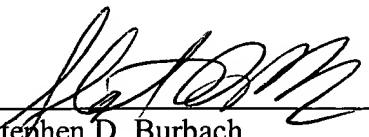
Moreover, there is no teaching or suggestion that the asserted combination would provide the alleged advantages or even function properly. Agarossi discloses a specific matched filter, nonlinear combiner and transversal FIR filter combination. There is no teaching or suggestion that this specific circuit could be modified with the specific dedicated circuit of Sands. Furthermore, there is no teaching or suggestion regarding how this could be done or whether this could be accomplished without the combined circuits interfering with one another and actually reducing the performance of the circuit.

Applicant respectfully submits the specific combinations set forth in claims 23 - 36, 45 and 50 are not taught or suggested by Sakaguchi, Agarossi and Sands.

### CONCLUSION

In view of the above Applicant submits that the claims are patentably distinct over the cited references and that all the objections/rejections to the claims have been overcome. Reconsideration and reexamination of the above application is requested.

Respectfully submitted,  
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